Technical Paper 373

LEVEL II

12

RELATIONSHIP BETWEEN LEADER KNOWLEDGE, DIRECTIVE BEHAVIOR, AND PERFORMANCE IN ADMINISTRATIVE, TECHNICAL, AND COMBAT SITUATIONS

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This paper presents an analysis of data acquired in previous ARI officer prediction research to learn to what extent two broad characteristics of officer behavior--military knowledge and directiveness/decisiveness--are associated with superior performance in the three major areas of officer assignments--combat, technical, and administrative.

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Four groups of officers were identified: high knowledge and high decisiveness, high knowledge and low decisiveness, low knowledge and high decisiveness, and low knowledge and low decisiveness. Performance scores and observations of decisiveness obtained for each officer were analyzed with respect to officers' technical and tactical knowledge.

Superior performance was found to be positively related to both military knowledge and decisiveness. Knowledge, whether technical or tactical in content, was more important in administrative and technical situations. Decisiveness was markedly more important in combat situations. The analysis confirmed the importance of matching an officer's leadership style and qualifications to the requirements of an assignment to insure effective performance.

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Officer Selection

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FOREWORD

The Personnel and Management Technical Area of the Army Research Institute for the Behavioral and Social Sciences (ARI) conducts a continuing research program to provide the Army personnel management system with ways to identify and select good leaders and evaluate their performance. ARI Research Reports 1172, 1173, and 1182 describe previous research on officer performance using an Officer Evaluation Center (OEC) simulation. This report analyzes the OEC data in order to discover the relationship between officer performance in different situations and leader characteristics of military knowledge and decisiveness.

The OEC research was originally done under Army Research and Development Project 2Q062106A722, Officer Prediction, in support of the Deputy Chief of Staff for Personnel (DCSPER). The continuing technology base research on officer careers, responsive to the DCSPER, was conducted under Army Project 2Q162717A766 in FY 1978 and 2Q162722A766 in FY 1979.

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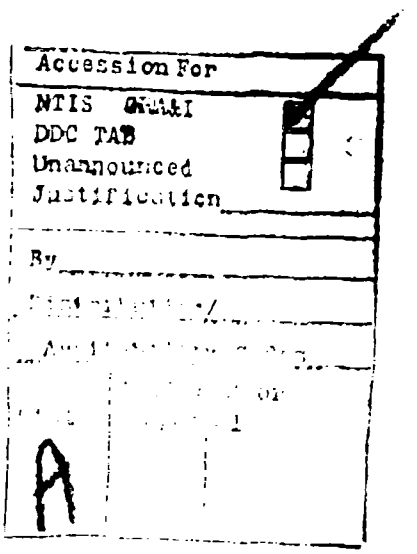

RELATIONSHIP BETWEEN LEADER KNOWLEDGE, DIRECTIVE BEHAVIOR, AND PERFORMANCE IN ADMINISTRATIVE, TECHNICAL, AND COMBAT SITUATIONS

BRIEF

Requirement:

To find to what extent two broad characteristics of officer leader behavior--military knowledge and directiveness/decisiveness--are associated with level of performance in the three major areas of officer assignments--combat, technical, and administrative.

Procedure:

Using data acquired in ARI's officer prediction research, four groups of officers were identified: high knowledge, high decisiveness; high knowledge, low decisiveness; low knowledge, high decisiveness; and low knowledge, low decisiveness. Performance scores and observations of decisiveness were obtained for officers in these groups. Analysis was performed separately for technical knowledge and tactical knowledge.

Findings:

Both military knowledge and decisiveness were, as hypothesized, found to be positively related to superior performance.

Military knowledge, whether technical or tactical in content, was found to be more important in administrative and technical problem situations. Directiveness//decisiveness was markedly more important to successful performance in combat situations.

Utilization:

The Officer Evaluation Center in a general sense constituted a systems measurement bed which brought together a large number of varying factors, personal and situational, so that selected factors could be studied in interaction. The relationships established can be useful to both research and management in developing, consistent with events, improved procedures for officer career management.

The present analysis has confirmed the importance of officer leadership style to effective performance in assignments having different requirements.

RELATIONSHIP BETWEEN LEADER KNOWLEDGE, DIRECTIVE BEHAVIOR, AND PERFORMANCE IN ADMINISTRATIVE, TECHNICAL, AND COMBAT SITUATIONS

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BACKGROUND

Early identification of officer leaders and development of officer leadership from cadet training through company and field grade assignments are of major concern in the management of the Army's manpower resources. The Army Research Institute for the Behavioral and Social Sciences (ARI) conducts research to provide scientific means of identifying individuals with good leadership potential for officer training, selecting officers for commissioning, and evaluating their performance. Differential prediction and evaluation have become dominant objectives in the effort to channel officers into appropriate assignments and develop their potential so as to make best use of their abilities.

Research on the relationship of leadership styles to effective performance has concentrated to a considerable extent on two approaches: (1) the effects of different behavioral styles on group performance and career satisfaction, and (2) the differential effectiveness of leadership styles in situations differing in leader-follower task relationships. Concepts such as initiation of structure and personal consideration (e.g., Stogdill, 1974; Fleishman, 1973) have been developed and investigated in the first approach; concepts such as task orientation versus person-relationship orientation and definition of dimensions of favorableness (e.g., Fiedler, 1974) have been developed and investigated in the second approach. Concurrently, the Army's research on officer leadership has developed and validated realistic assessment processes for measuring leader behavior. This has led to the use of "test beds," in which the situational demands are defined, and it has yielded constructs interrelating leader characteristics, leader behaviors, and situational requirements (e.g., Uhlaner, 1970, 1975, 1978; Helme, Willemin, & Grafton, 1971, 1974; Helme, Willemin & Day, 1971).

Officer prediction research was undertaken by ARI to meet the need to improve the selection and assignment of personnel for different officer leadership positions. Analysis of duties performed by officers pointed initially to three groups of officer assignments--combat, technical, and administrative--which appeared to call for different patterns of leader behavior. The basic research design was longitudinal. Experimental measures were obtained on officers immediately after their entry on active duty, and performance evaluations were obtained at subsequent points in the officers' careers. From the original sample of 4,000, 900 officers were selected in the later phase of the program as representative of various branches of service. These officers took part in an experimentally controlled 3-day exercise at the Officer Evaluation Center (OEC) established for the purpose at Fort McClellan, Ala. The scenario for the exercise presented the officer with 15 problem

situations, 5 each in combat, technical, and administrative settings (Figure 1). The problem situations were designed to yield objective recorded data on specific details of each officer's performance, as well as judgmental evaluations of style of behavior and effectiveness in aspects of each task and in each situation.

In addition to the evaluations of officer performance obtained at the OEC, ratings were obtained of all officers who had taken the Differential Officer Battery, which measures a variety of knowledges, skills, and aptitudes, at entry on active duty.

Criterion data were analyzed to yield information about the officers--the requirements of their jobs, the various ways in which they carried out their responsibilities as leaders, and what general modes of behavior characterized good and poor accomplishment of various missions. Analysis of test and criterion data revealed characteristics of officers who would be likely to succeed or to perform less well as officers.

The ARI selection research program enhanced the value of the procedures and provided useful measures of general verbal and quantitative ability at higher levels. Measurement of personal attributes had yielded only modest predictive validity. The major contribution from the research findings was the realization that leadership behavior was highly complex and that the situation in which it was evaluated would have to be considered fully. A major contribution of the evaluation segment of the research was to define more clearly this requirement for new evaluation approaches, particularly those emphasizing the situation in which leadership behavior was to be evaluated.

ARI's program in this area continues to be a many-faceted attack on major officer personnel problems--improved methods for selection, assignment, and promotion actions; continuing reevaluation of each officer's potential in terms of available career assignments; and development of a new research-based system of performance evaluation responsive to particular Army needs for given personnel decisions. This research utilizes ARI's experience with simulating leadership problem situations, with its implications for adapting officer training exercises to individual measurement, for applying models in design and testing of officer evaluation systems and subsystems, and for computer-assisted simulation and feedback.

Research on officer prediction has done more than provide precommissioning measures. The behavioral dimensions have helped shape the constructs that are being used in research to develop a system for selecting and evaluating officers that meets the changing patterns of officer career development.

DAY ONE: MAAG Office--Peacetime

Test situation	Time	
Technical/ managerial	0730	Inspect 3 MAAG vehicles for combat readiness; recommended or take actions to correct deficiencies
Administrative	1030	Correct poor supply records of Host Nation Army unit; explain errors to unit's antagonistic CO
Technical/ managerial	1330	Check for bugs in communication network display for visit of Host Nation VIP; recommend or make corrections
	1630	Supper
Administrative	1745	Evaluate report on personnel office of Host Nation Army unit; recommend changes in organization and work flow
Administrative	1945	Study production records of Host Nation ordnance platoon; reschedule work assignments of repairmen
	2230	To BOQ

DAY TWO: MAAG Office--Wartime
HOST NATION INVADED WITH NUCLEAR STRIKES

Technical/ managerial	0300	By radio, direct 4 jeep-mounted survey teams on Host Nation terrain reporting road damage, radiation levels, and other conditions
Technical/ managerial	1200	Evaluate captured foreign weapon brought back by one of survey teams
Administrative	1330	Study Host Nation map to select new depot sites; defend selections of depot sites made by MAAG CO
Administrative	1630	On map, select new highway net to carry materiel from chosen depot sites to forward supply points
Technical/ managerial	1900	Evaluate potential hasty airstrip sites and compute runway length
	2000	To BOQ

Figure 1. Schedule of activities in 3-day Officer Evaluation Center.

DAY THREE: Guerrilla Operations
SITUATION DETERIORATES

Test situation	Time	
	0030	Evacuate MAAG Hq Office; trucked to woods; 5-mile night-march through woods to MAAG Field CP
Combat	0330	In bunker, prepare Company March Order to move friendly guerrilla unit
Combat	0700	Prepare roadblock, first instructing NCOs in placing demolitions on trees to form abatis
Combat	0900	With NCOs (one is unmanageable), recon Helicopter LZ and plan deployment of platoon in its defense
Combat	1000	From prepared Observation Post, report enemy activities and potential targets
	1100	Lunch
Combat	1130	Lead route recon patrol in jeep; captured, interrogated, released, and returned to US control
	1430	CEASEFIRE: FOREIGN NATIONALS LEAVE HOST NATION

Figure 1 (Continued)

Research methodology has been developed to support the measurement of performance by means which also consider the elusive noncognitive and situational elements influencing performance.

OBJECTIVE OF THE PRESENT ANALYSIS

The research program outlined above addressed the interrelationship of leader characteristics, leadership behaviors, and mission accomplishment in different military situations. From the comprehensive data of the entry test battery and the nearly 2,000 observations and evaluations of performance obtained in the 15 situations at OEC, measures of knowledges, skills, behaviors, and effectiveness were derived by factor analysis and logical interpretation. The data analysis in the present phase of the research, reported here, was concerned specifically

with the interrelationship of leader knowledge, style of behavior, and mission accomplishment in the three situational categories--combat, technical, and administrative. As indicated by the design of the research program, these situations were embedded in an overall combat environment under the time constraints, input overload, and simulated combat stress of that environment.

The principal hypotheses investigated were (a) that both a high level of military knowledge and leadership behavior characterized by a high level of directiveness-decisiveness would be positively related to superior performance in an officer, and (b) that high directiveness would be more important to performance in combat situations, and high knowledge more important to performance in technical and administrative situations.

DESIGN OF THE ANALYSIS

To test these hypotheses, a sample of over 600 lieutenants, chosen from participants in the officer prediction research program, was divided into high and low military knowledge groups on the basis of the tests taken on entry to active duty, previously validated in the original sample. The 600-man sample was partitioned twice: first, on the basis of knowledge of military tactics, and second on the basis of knowledge of military technology operations. Each officer was then evaluated on directiveness of leadership behavior in one situational context. Finally, each officer was evaluated on mission accomplishment in each of the 15 simulated combat situations. The mission-accomplishment evaluation for the situation in which directiveness had been judged was omitted from the analysis, in order to avoid rater halo or rater assumption that directiveness was necessarily positive. Criterion data of mission accomplishment were also dichotomized.

Scores and evaluations were tabulated separately for each situation in which directiveness/decisiveness was observed and also for each situation in which performance of the task or mission was evaluated. In situations where the officer worked alone on data and instructions that were provided--for example, producing a staff document--no observation of decisiveness could be made. In combat command situations, two separate estimates of decisiveness were made. One performance evaluation was made in each of the 15 situations. These were "total scores"--the weighted sums of separate observations and evaluations. Table 1 lists the specific observations used to estimate decisiveness and the 15 situations on which total performance scores were obtained.

RESULTS

The data consisted of mean performance scores for each of four groups: high knowledge, high decisiveness; high knowledge, low decisiveness; low knowledge, high decisiveness; and low knowledge, low decisiveness. Since the analysis was performed separately for tactical

Table 1

Observations of Decisiveness and the 15 Task-Situations Used to Evaluate Performance

Decisiveness observations	Situations
	Administrative tasks
None	Office management
None	Production analysis
Bearing and assurance (Interaction with allied officer)	Supply records
Bearing and assurance (Response to turbulence and time pressure stress)	Site selection
Bearing and assurance (Response to time pressure under stress)	Highway traffic
	Technical tasks
Bearing and assurance (Technical presentation to superiors)	Communications exhibit
Bearing and assurance (Direction of men)	Automotive inspection
None	Weapons assessment
None	Airfield layout
Bearing and assurance (Response to actual combat environment)	March order
	Combat tasks
Command of Men Decisiveness	Road damage and radiation survey
Command of Men Decisiveness	Security mission
Command of Men Decisiveness	Roadblock
Command of Men Decisiveness	Reconnaissance patrol
Bearing and assurance (Response in actual combat environment)	Observation post

and for technical knowledge and for observations of decisiveness in each of 15 situations (Table 1), there were 2 x 15 x 15 = 450 replications. Each set of mean performance scores was analyzed on a two-way fixed analysis of variance.

These analyses yielded F-ratios that proved highly significant for the main effects of knowledge and decisiveness, but in only a few instances (although well above chance incidence) in interaction variance. A summary of findings on the F-ratios is given in Tables 2 and 3. Technical knowledge accounted for significant variance in performance in 62% of the effects analyzed, decisiveness in 80%, and interaction in 22%. Tactical knowledge accounted for significant variance in 85%, decisiveness in 81%, and interaction in 20% of the effects analyzed.

Given these findings of substantial significance, the next step was to estimate the percentage of variance accounted for by each effect, using Winer's method (1971, pp. 428-430). Table 4 shows the percentage of variance in performance in 15 situational tasks attributable to technical knowledge, decisiveness, and interaction. The mean variance explained by technical knowledge was 4.00%; by decisiveness, 6.39%; and by interaction, 0.85%. Table 5 shows the same statistics for tactical knowledge, decisiveness, and interaction. The mean variance explained by tactical knowledge was 3.67%; by decisiveness, 6.53%; and by interaction, 0.74%. These results clearly showed that across all situations, decisiveness accounted for a substantial majority of the performance variance explained.

On closer examination, however, Tables 4 and 5 reveal that in administrative and technical tasks involving no interaction with subordinates or colleagues, performance variance attributable to knowledge exceeded that attributable to decisiveness except in one highly complex task, the communications exhibit. Strikingly, the reverse result was found for the combat command tasks, especially for the road damage and radiation survey task, a command-and-control task lasting 8 hours (the longest of the problem situations) that imposed extreme pressures of emergency decision and input overload.

Considering category of situation, the mean percentage of variance attributable to each source was as follows:

Situation	Technical knowledge	Decisiveness	Interaction
Administrative	4.24%	3.15%	0.74%
Technical	3.56	5.48	0.90
Combat	4.21	10.53	0.91

Table 2

Number of Significant F-Ratios for Effects of Technical Knowledge, Decisiveness, and Interaction on Performance

Number of F-tests[a]	Situation	Technical knowledge	Decisiveness	Interaction
15	Office management	10	9	3
15	Production analysis	10	11	1
14	Supply records	8	13	5
14	Site selection	9	6	1
14	Highway traffic	9	9	2
14	Communications exhibit	6	13	3
14	Automotive inspection	7	12	5
15	Weapons assessment	8	15	7
15	Airfield layout	10	8	2
14	March order	9	9	0
13	Road damage & radiation survey	8	13	4
13	Security mission	8	12	3
13	Roadblock	11	12	4
13	Reconnaissance patrol	8	13	3
14	Observation post	9	12	3
Total		130	167	46
		62%	80%	22%

Note. Significant at .01 level.

[a]No F-test made in situation where decisiveness measure was obtained.

Table 3

Number of Significant F-Ratios for Effects of Tactical Knowledge, Decisiveness, and Interaction on Performance

Number of F-tests[a]	Situation	Tactical knowledge	Decisiveness	Interaction
15	Office management	13	11	2
15	Production analysis	12	12	2
14	Supply records	12	14	3
14	Site selection	13	6	5
14	Highway traffic	13	9	1
14	Communications exhibit	11	14	3.
14	Automotive inspection	12	13	3
15	Weapons assessment	12	15	4
15	Airfield layout	13	8	4
14	March order	12	9	1
13	Road damage & radiation survey	11	13	2
13	Security mission	10	11	4
13	Roadblock	13	11	3
13	Reconnaissance patrol	9	13	3
14	Observation post	12	12	2
Total		178 85%	171 81%	42 20%

Note. Significant at .01 level.

[a]No F-test made in situation where decisiveness measure was obtained.

Situation	Tactical knowledge	Decisiveness	Interaction
Administrative	4.17%	3.73%	0.69%
Technical	3.57	5.57	0.78
Combat	3.28	10.30	0.75

Here again, knowledge--whether technical or tactical--was found to be more important in administrative task situations; decisiveness was more important in technical task situations. Decisiveness was markedly more important in combat task situations. The foregoing data are presented graphically in Figures 2 and 3.

Table 4

Percentage of Variance in Performance of 15 Situational Tasks Attributable to Technical Knowledge, Decisiveness, and Interaction

Situational task	Knowledge (K)	Decisiveness (D)	K × D
Office management	4.83	2.50	0.63
Production analysis	4.37	3.03	0.57
Supply records	3.50	6.36	0.93
Site selection	4.36	2.36	0.57
Highway traffic	4.14	1.50	1.07
Communications exhibit	2.43	7.64	0.93
Automotive inspection	3.50	6.57	1.21
Weapons assessment	3.04	7.43	1.23
Airfield layout	4.77	1.83	0.63
March order	4.07	3.93	0.50
Road damage & radiation survey	2.42	16.04	0.73
Security mission	4.42	10.42	0.73
Roadblock	4.88	9.12	1.65
Reconnaissance patrol	4.27	9.65	0.73
Observation post	5.07	7.43	0.71
Mean	4.00	6.39	0.85

The last aspect investigated in the present analysis was the relationship of the situation in which decisiveness was observed to the percentage of variance attributable to each source. For this analysis, the six observations of decisiveness in administrative and technical task situations (three measures of bearing and assurance in each of the

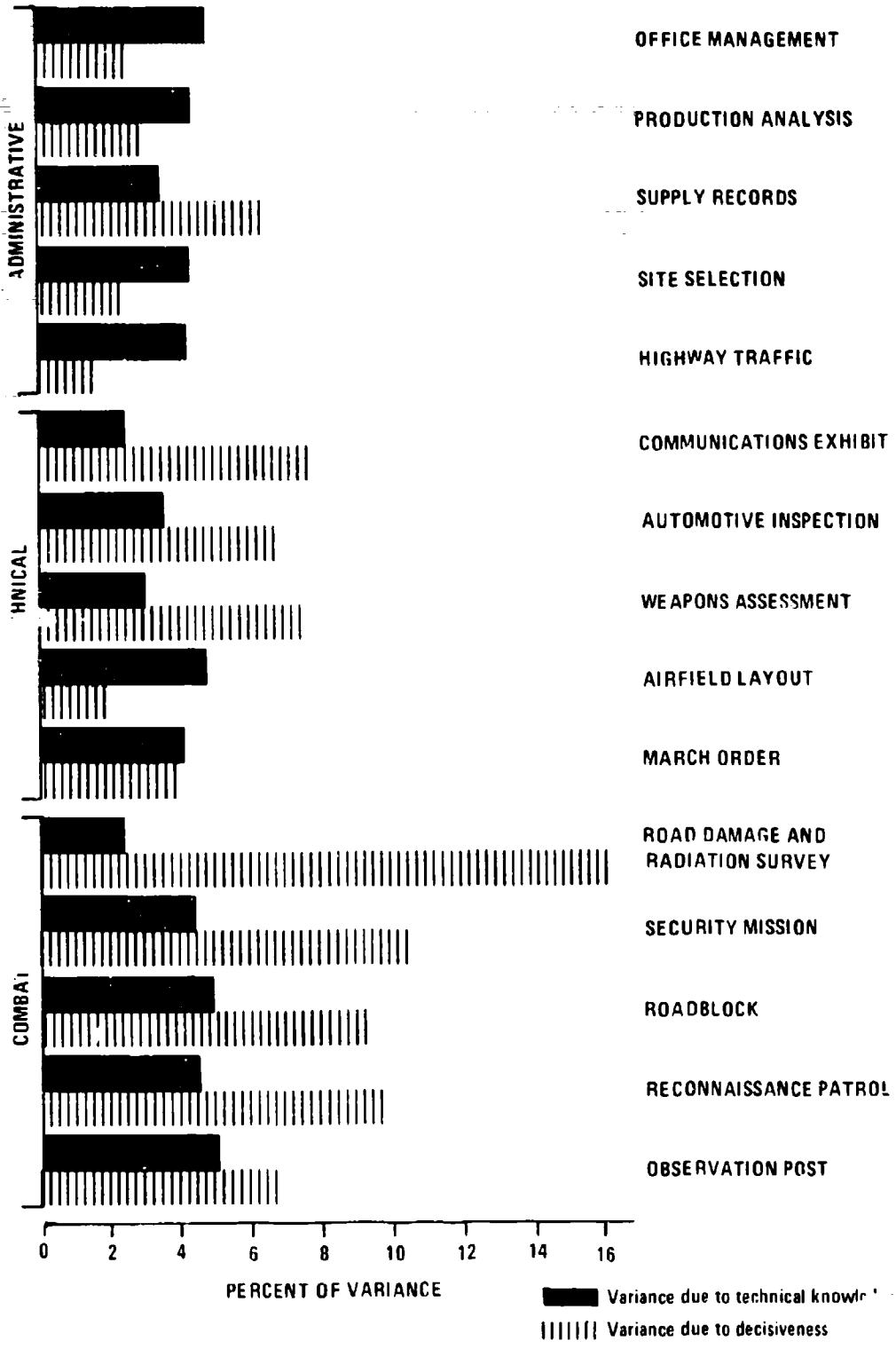

Figure 2. Variance effects of technical knowledge and decisiveness on performance in 15 situational tasks of OEC.

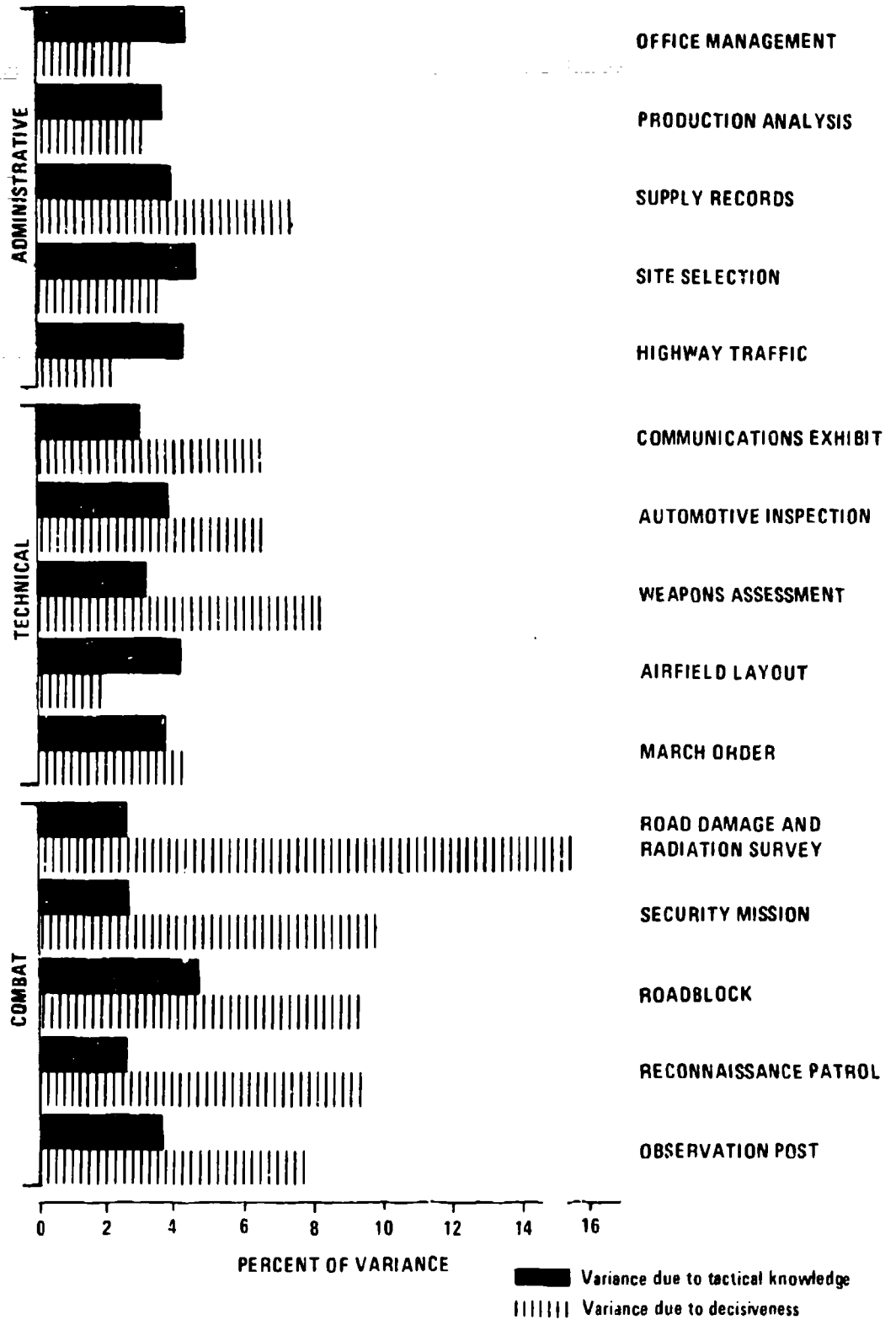

Figure 3. Variance effects of tactical knowledge and decisiveness on performance in 15 situational tasks of OEC.

two task categories) were averaged and compared with the average of the nine decisiveness measures in the combat situations. The results (Table 6) demonstrated that in the technical task situations, technical knowledge contributed more to performance variance than decisiveness did (6.44 vs. 4.84), but that the reverse was found for decisiveness observed in combat command tasks (2.41 vs. 7.75). Tactical knowledge, however, contributed less to performance in all tasks than did decisiveness in technical staff situations (3.25 vs. 5.38). The difference was even greater when decisiveness was observed in combat situations (3.97 vs. 7.49). Apparently, decisiveness itself may also be responsive to situational demands and to an officer's particular expertise. To put it another way, an officer can be more decisive if he or she knows what to be decisive about. Figure 4 shows these data graphically.

Table 5

Percentage of Variance in Performance of 15 Situational Tasks Attributable to Tactical Knowledge, Decisiveness, and Interaction

Situational task	Knowledge (K)	Decisiveness (D)	K x D
Office management	4.37	2.57	0.63
Production analysis	3.70	3.10	0.77
Supply records	3.93	7.36	0.71
Site selection	4.57	3.50	0.71
Highway traffic	4.29	2.14	0.64
Communications exhibit	2.93	7.07	0.79
Automotive inspection	3.86	6.50	0.79
Weapons assessment	3.17	8.17	0.97
Airfield layout	4.17	1.90	0.70
March order	3.71	4.21	0.64
Road damage & radiation survey	2.58	15.42	0.73
Security mission	2.73	9.81	0.79
Roadblock	4.73	9.27	0.79
Reconnaissance patrol	2.65	9.27	0.88
Observation post	3.71	7.71	0.57
Mean	3.67	6.53	0.74

Table 6

Differential Effects of Knowledge and Decisiveness on Task Performance as a Function of Situations in Which Decisiveness and Performance Were Observed

Percentage of variance attributable to technical knowledge

Situation-category of decisiveness	Situation-category of performance			
	Administrative	Technical	Combat	All
Technical staff	6.88	6.04	6.40	6.44
Combat command	2.72	2.08	2.42	2.41
All	4.39	3.66	4.01	4.02

Percentage of variance attributable to decisiveness

	Administrative	Technical	Combat	All
Technical staff	3.57	3.86	7.08	4.84
Combat command	2.94	6.37	13.94	7.75
All	3.19	5.40	11.20	6.59

Percentage of variance attributable to tactical knowledge

	Administrative	Technical	Combat	All
Technical staff	3.52	2.97	3.27	3.25
Combat command	4.53	3.97	3.31	3.97
All	4.19	3.57	3.29	3.68

Percentage of variance attributable to decisiveness

	Administrative	Technical	Combat	All
Technical staff	4.42	4.91	6.77	5.38
Combat command	3.44	5.90	13.11	7.49
All	3.83	5.50	10.57	6.64

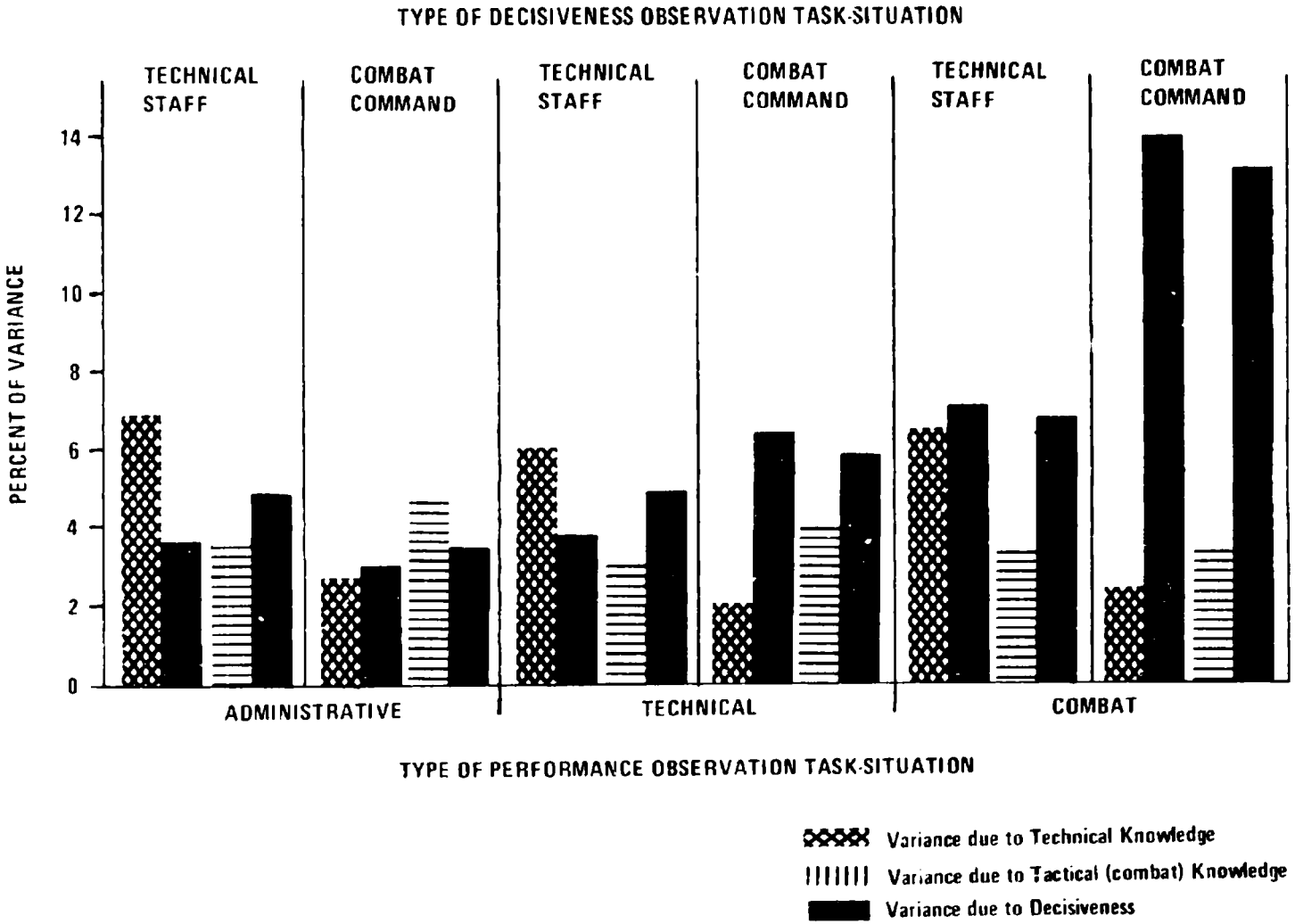

Figure 4. Differential effects of knowledge and decisiveness on task performance as a function of situations in which decisiveness and performance were observed.

CONCLUSIONS

The results suggested support for the first hypothesis: that the leader's military knowledge and decisiveness of behavior are highly related to effectiveness of performance in a wide range of task situations. In the test bed of a simulated combat emergency, evidence indicates that knowledge and decisiveness are important to performance. Tables 4 and 5 show that measures of knowledge account for from 2.4% to 5% of the variance in performance of given tasks, with no consistent differences among the categories of administrative, technical, and combat tasks. The mean variance accounted for by decisiveness, while showing wider differences, was 6.39% and 6.53% when analyzed in connection with technical knowledge and tactical knowledge, respectively. The evidence for the second hypothesis--that decisiveness is more important in combat situations and that knowledge is more important in administrative and technical situations--is also strong. The variance accounted for by decisiveness is far greater in the combat tasks, ranging from 7.4% to 16%, as compared to a range of 1.9% to 7.6% in the administrative and technical tasks.

The Officer Evaluation Center provided a setting in which varying factors of environment, type of mission, interpersonal relationships, situational problems, and stresses were brought together. The officers brought their different capabilities and individual ways of dealing with problems and interacting with environmental and situational factors. The results are generalizable beyond the specific situations, and, with some caution, to major dimensions of leadership and officer performance.

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